Acta Zoologica Academiae Scientiarum Hungaricae 52 (4), pp. 367–372, 2006

REDESCRIPTION OF *DORYPHORIBIUS VIETNAMENSIS* (IHAROS, 1969) (TARDIGRADA) COMB. NOV. ON THE BASIS OF THE HOLOTYPE AND ADDITIONAL MATERIAL FROM CHINA

BEASLEY, C. W.[1], KACZMAREK, Ł[2]. and MICHALCZYK, Ł.[3]

[1]*Department of Biology, McMurry University, Abilene, Texas 79697, USA*
E-mail: beasleyc@mcmurryadm.mcm.edu
[2]*Department of Animal Taxonomy & Ecology, Institute of Environmental Biology, A. Mickiewicz University, Szamarzewskiego 91 a, 60–569 Poznań, Poland; E-mail: kaczmar@amu.edu.pl*
[3]*School of Biological Sciences, University of East Anglia*
NR4 7TJ Norwich, UK; E-mail: agnostic@poczta.fin

Doryphoribius vietnamensis comb. nov. described by G. IHAROS in 1969 as *Hypsibius vietnamensis* and transferred to the genus *Isohypsibius* by RAMAZZOTTI and MAUCCI in 1983 is redescribed and figured.

Key words: *Doryphoribius vietnamensis* comb. nov., *Hypsibius vietnamensis*, *Isohypsibius vietnamensis*, Tardigrada, redescription.

INTRODUCTION

Hypsibius vietnamensis IHAROS, 1969 was described from Huong tich, 60 km south-west of Hanoi in Vietnam. RAMAZZOTTI and MAUCCI (1983) transferred it to the genus *Isohypsibius* on the basis of drawings of claws. BEASLEY and CLEVELAND (1996) reported *Isohypsibius vietnamensis* (IHAROS, 1969) from Yunnan Province in China. We have re-examined specimens described by IHAROS (holotype) and those from China and determined that they should be transferred to the genus *Doryphoribius* due to their bucco-pharyngeal apparatus structure. Many years ago *Hypsibius (Isohypsibius) flavus* IHAROS 1966 was also transferred to the genus *Doryphoribius* SCHUSTER and TOFTNER (1982). It may suggest that some other species of genus *Isohypsibius* should also by transferred to genus *Doryphoribius*. Genus *Doryphoribius* differs from *Isohypsibius* by the presence of the ventral reinforcement bar on the buccal tube.

MATERIAL AND METHODS

Holotype of *Doryphoribius vietnamensis* comb. nov. from Vietnam and 4 other specimens (one in the simplex stage) of *D. vietnamensis* from China were studied.

All measurements are given in micrometers [μm]. Body length was measured from the mouth to the end of the body, excluding the hind legs. Buccal tube length and level of the stylet support insertion point were measured according to PILATO (1981). Buccal tube widths were measured as the internal diameters at the level of the stylet support insertion point. Lengths of claws were measured from the base of the claw to the top of the primary/secondary branch, including accessory points. The *pt* ratio is the ratio of the length of a given structure to the length of the buccal tube expressed as a percentage (PILATO 1981). In the description the *pt* is given after μm value [in square brackets and in *italics*].

Measurements of *Doryphoribius vietnamensis* comb. nov. were made on holotype and other examined specimens from China.

Photomicrographs were made using Phase Contrast Microscope (PCM).

Doryphoribius vietnamensis (IHAROS, 1969) **comb. nov.**
(Figs 1–2, 5–6, 8–9)

Hypsibius vietnamensis IHAROS, 1969
Isohypsibius vietnamensis (IHAROS, 1969) (in RAMAZZOTTI and MAUCCI 1983)

Type material: Holotype: Vietnam, Huong tich, Pagoda Caves (Duc khé, Huong-son), 60 km south-west of Hanoi, mosses from soil, 1966, leg. Dr GY. TOPÁL. In the same sample two other species were found: *Macrobiotus hufelandi* SCHULTZE, 1833 and *Minibiotus intermedius* (PLATE, 1888).

Additional material: 2 specimens from Dinghu, Guangdong Province, China, from moss; 2 specimens from Meng-lun (Xiaomenglun), Yunnan Province, China, from moss from tree.

Redescription of the holotype. Body length 251.8 (Figs 1–2). Large eyes present in anterior position. Body colour not visible (IHAROS (1969) reported that specimens of *I. vietnamensis* are dark yellow-orange). Cuticle on dorsal side of body with fine granulation. Cuticle on ventral side of body smooth. Dorsal side with rows of gibbosities (Fig. 2).

Bucco-pharyngeal apparatus of *Doryphoribius* type with ventral reinforcement bar (Figs 5–6, Fig. 5 after IHAROS (1969) without reinforcement bar). Mouth antero-ventral. Buccal tube 34.7 long and 3.3 [9.5] wide. At end of buccal tube triangular or rounded pharyngeal apophyses present. Stylet supports inserted on buccal tube at 24.0 [69.2]. Pharyngeal bulb oval, with three rounded macroplacoids. Microplacoid and septula absent. First macroplacoid 2.9 [8.4], second 3.3 [9.5] long and third 3.8 [10.9]. Macroplacoid row 10.9 [31.4] long (Figs 5–6).

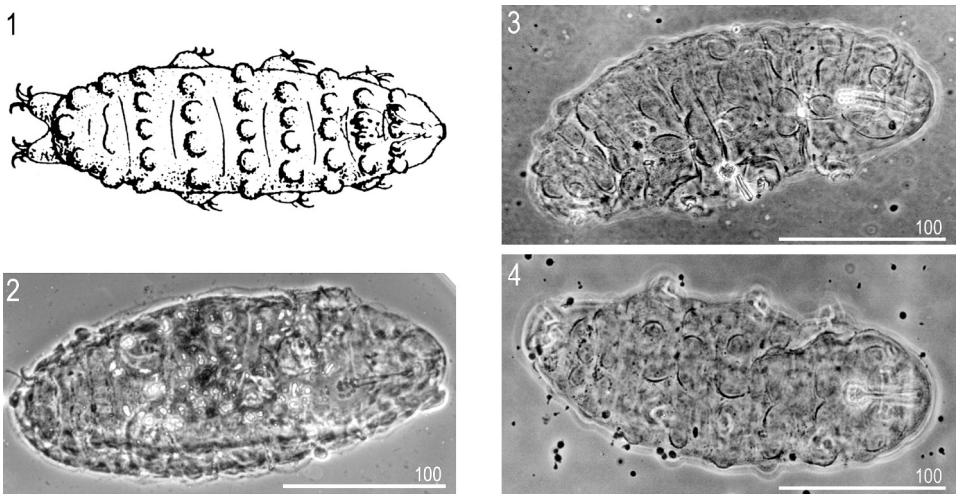
Claws of *Isohypsibius* type. Lengths of external claws of fourth pair of legs: primary branch 15.2 [43.8], secondary branch 9.5 [27.4]. Primary branches of claws with well developed accessory points. Lunules and other cuticular structures not detectable (Figs 8–9). Eggs unknown.

Distribution: Vietnam and China.

Remarks – The holotype is in a bad condition and the dorsal gibbosities are weakly visible. Based on the original description they are arranged in 9 rows covered by tiny granulation (2 gibbosities in row 8; 3 in row 9; 4 in rows 2, 4, 6; 5 in rows 1, 3, 5, 7). Also claws on the first three pair of legs are almost invisible and it is not possible to observe lunules or other cuticular structures. In the original description the author did not mention these structures. Description based on additional specimens from China (Figs 3–4, 7, 10).

Table 1. Measurements [in μm] of selected morphological structures of specimens of *Doryphoribius vietnamensis* comb. nov. mounted in Hoyer's medium (animals in the body length order, specimens other than the Holotype were collected from China).

Character	C-20–35	Holotype	C-20–34	C-67–2	C-67–3
Body length	216.0	251.8	257.0	305.0	345.0
Buccal tube length	27.8	34.7	33.9	?	?
Level of the stylet support insertion point	19.2	24.0	23.5	?	?
Buccal tube external width	1.8	3.3	3.2	3.3	?
Macroplacoid 1 length	1.8	2.9	2.3	3.1	?
Macroplacoid 2 length	1.5	3.3	2.1	2.8	?
Macroplacoid 3 length	1.9	3.8	2.9	3.5	?
Placoid row length	7.4	10.9	8.5	10.7	13.9
Primary branch of claw 1 length	9.9	?	11.0	13.8	9.1
Secondary branch of claw 1 length	7.3	?	8.2	10.3	?
Primary branch of claw 2 length	9.9	?	11.2	?	9.4
Secondary branch of claw 2 length	?	?	8.7	10.2	?
Primary branch of claw 3 length	10.5	?	?	?	?
Secondary branch of claw 3 length	6.9	?	?	?	?
Primary branch of claw 4 length	10.8	15.2	?	16.8	?
Secondary branch of claw 4 length	8.3	9.5	9.8	10.3	?

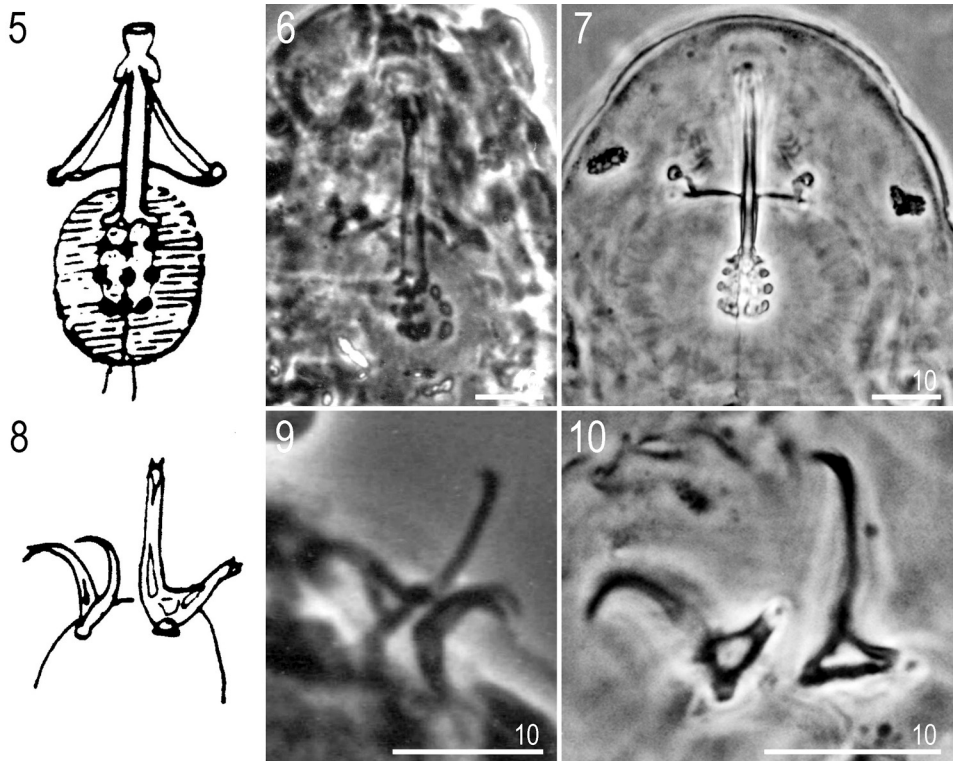


Figs 1–4. *Doryphoribius vietnamensis* comb. nov., habitus: 1 = original drawing from IHAROS (1969), 2 = holotype, 3–4 = specimens collected from China

Body length 216.0–345.0 (Figs 3–4). Large eyes present in anterior position. Cuticle on dorsal side of body covered by fine granulation. Cuticle on ventral side of body smooth. Dorsal side with rows of gibbosities covered by tiny granulation (Figs 3–4). Arrangement of gibbosities same as in original description by IHAROS (1969).

Bucco-pharyngeal apparatus of *Doryphoribius* type (Fig. 7) with ventral reinforcement bar. Mouth antero-ventral. Buccal tube 27.8–33.9 long and 1.8–3.3 [6.5–9.4] wide. At end of buccal tube triangular or rounded pharyngeal apophyses. Stylet supports inserted on buccal tube at 19.2–23.5 [69.0–69.3]. Pharyngeal bulb oval, with three rounded macroplacoids. Microplacoid and septula absent. First macroplacoid 1.8–3.1 [6.7–6.8] long, second 1.5–2.8 [5.4–6.2] and third 1.9–3.5 [6.8–8.5]. Macroplacoid row 7.4–10.7 [25.0–26.6] long.

Claws of *Isohypsibius* type. Lengths of external claws: I pair: primary branch 9.9–13.8 [32.4–35.6], secondary branch 7.3–10.3 [24.2–26.3]; II pair: pb. 9.4–9.9 [33.0–35.6], sb. 8.7 [25.7]; III pair: pb. 10.5 [37.8], sb. 6.9 [24.8]; IV pair: pb. 10.8 [38.8], sb. 8.3–9.8 [28.9–29.9]. Primary branches of claws with well developed accessory points. Lunules and other cuticular absent (Fig. 10). Eggs unknown.



Figs 5–10. *Doryphoribius vietnamensis* comb. nov.: 5–7 = bucco-pharyngeal apparatus; 8–10 = claws of the fourth pair of legs (5 and 8 – original drawing from IHAROS (1969); 6 and 9 = holotype; 7 and 10 = specimen collected from China)

Table 2. The *pt* values of selected morphological structures of specimens of *Doryphoribius vietnamensis* comb. nov. mounted in Hoyer's medium (animals in the body length order, specimens other than the Holotype were collected from China).

Character	C-20–35	Holotype	C-20–34
Level of the stylet support insertion point	69.06	69.16	69.32
Buccal tube external width	6.47	9.51	9.44
Macroplacoid 1 length	6.47	8.36	6.78
Macroplacoid 2 length	5.40	9.51	6.19
Macroplacoid 3 length	6.83	10.95	8.55
Placoid row length	26.62	31.41	25.07
Primary branch of claw 1 length	35.61	?	32.45
Secondary branch of claw 1 length	26.26	?	24.19
Primary branch of claw 2 length	35.61	?	33.04
Secondary branch of claw 2 length	?	?	25.66
Primary branch of claw 3 length	37.77	?	?
Secondary branch of claw 3 length	24.82	?	?
Primary branch of claw 4 length	38.85	43.80	?
Secondary branch of claw 4 length	29.86	27.38	28.91

Differential diagnosis

Doryphoribius vietnamensis comb. nov. is similar to *Doryphoribius gibber* BEASLEY et PILATO, 1987, *D. mariae* PILATO et BINDA, 1990 and *D. zyxiglobus* (HORNING *et al.,* 1978).

D. vietnamensis differs from *D. gibber, D. mariae* and *D. zyxiglobus* in the number of rows of gibbosities (9 in *D. vietnamensis* comb. nov., 8 in *D. zyxiglobus*, 10 in *D. gibber* and 12 in *D. mariae*) and number of gibbosities in each row (gibbosities formula: 5, 4, 5, 4, 5, 4, 5, 2, 3 in *D. vietnamensis* comb. nov.: 4, 4, 4, 4, 4, 4, 4, 2, 2, 3 in *D. gibber*, 6, 4, 6, 4, 6, 4, 4, 2 in *D. zyxiglobus* and 4 or 6 gibbosities in rows 1–11 and 1 gibbosity in row 12).

*

Acknowledgements – We want to thank Dr. SÁNDOR MAHUNKA of the Hungarian Natural History Museum for loaning the holotype of *Hypsibius vietnamensis*. Dr. WOJCIECH MAGOWSKI (Poland) made the Phase Contrast Microscope available to us.

REFERENCES

BEASLEY, C. W. & CLEVELAND, A. (1996) Tardigrada from southern Yunnan Province, People's Republic of China. *Zoological Journal of Linnean Society* **116**: 239–243.

IHAROS, G. (1969) Enige Angaben zur Tardigradenfauna Vietnams. *Opuscula Zoologica, Budapest* **9**: 273–277.

PILATO, G. (1981) Analisi di nuovi caratteri nello studio degli Eutardigradi. *Animalia* **8**: 51–57.

RAMAZZOTTI, G. & MAUCCI, W. (1983) Il Phylum Tardigrada. *Memorie dell'Istituto Italiano di Idrobiologia*, *Pallanza* **41**: 1–1012.

SCHUSTER R. O. & TOFTNER E. C. (1982) *Dominican Republic Tardigrada. Proceedings of Third International Symposium on the Tardigrada*. East University Press, Johnson City, Tennessee 37614–0002, USA.

Revised version received July 23, 2006, accepted September 15, 2006, published December 29, 2006